Journal of Quantitative Spectroscopy & Radiative Transfer 109 (2008) 1447–1460

Journal of Quantitative Spectroscopy & Radiative Transfer

www.elsevier.com/locate/jqsrt

Comprehensive T-matrix reference database: A 2006–07 update

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Received 21 December 2007; accepted 3 January 2008

Abstract

This paper presents an update to the comprehensive database of T-matrix publications authored by us previously and mostly includes the publications that appeared since 2005. It also lists several earlier publications not included in the original database.

Keywords: Electromagnetic scattering; T-matrix method

1. Introduction

The original database of T-matrix publications was published in 2004 [1] and updated in 2007 [2]. We have made the necessary corrections and straightforward updates in these papers, and the result is posted at http://www.giss.nasa.gov/~crmim/. Given the ever-increasing popularity of the T-matrix approach (Fig. 1), we decided to publish a second update. As in [1,2], we adhere to the following general restrictions:

- With a few important exceptions, the database includes only publications dealing with electromagnetic scattering.
- As a rule, publications on scattering by isolated infinite cylinders and systems of parallel infinite cylinders in unbounded space are excluded.
- Publications on the Lorenz–Mie theory and its various extensions to radially inhomogeneous spherically symmetric scatterers are not included.
- The database includes only references to books, peer-reviewed book chapters, and peer-reviewed journal papers.

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0022-4073/$ - see front matter
doi:10.1016/j.jqsrt.2008.01.001

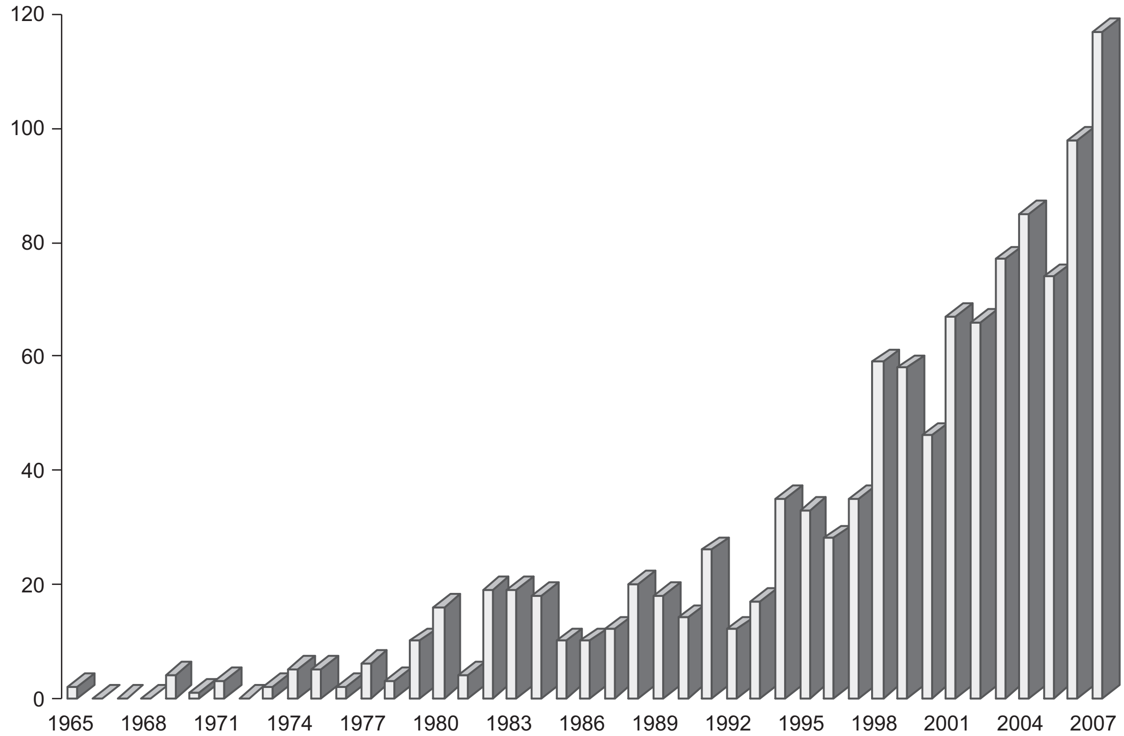

Fig. 1. Annual frequency distribution of the T-matrix publications related to electromagnetic scattering.

Also, we continue to use the following operational definition of the T-matrix method:

In the T-matrix method, the incident and scattered electric fields are expanded in series of suitable vector spherical wave functions, and the relation between the columns of the respective expansion coefficients is established by means of a transition matrix (or T matrix). This concept can be applied to the entire scatterer as well as to separate parts of a composite scatterer.

As before, the various references are classified into a set of narrower subject categories (Sections 2 and 3). The set of the subject categories is essentially the same as in [1,2]. However, there are a few original categories which are not populated since no relevant publications have appeared during the past two years.

As previously, we do not assess the validity and importance of the results described in the specific publications included in this database, which means that the inclusion of a publication does not constitute any formal endorsement or quality certification on our part. However, as a simple precautionary measure, we decided to include in the database only publications available in English. This excludes a few papers published in Russian and a substantial number of papers published in Chinese. We have a significant concern that some of the papers published in Chinese may contain no original material, but we are not in the business of trying to prove that. This explains the simple approach that we have adopted.

We plan to maintain an updated version of the combined database on the web site http://www.giss.nasa.gov/~crmim/ and ask the readers to keep helping us by sending corrections and missing references to existing and future publications on the T-matrix method and its various applications.

2. Particles in infinite homogeneous space

2.1. Books

Borghese et al. [3]

2.2. Reviews

Wriedt [4,5]

2.3. Extended boundary condition method and its modifications and generalizations

Farafonov et al. [6]
Il'in et al. [7]
Loke et al. [8]
Petrov et al. [9–13]
Waterman [14]

2.4. T-matrix theory and computations for anisotropic and chiral scatterers

Stout et al. [15]

2.5. Superposition T-matrix method and its modifications, including related mathematical tools

Auger et al. [16]
Gumerov and Duraiswami [17]
Litvinov and Ziegler [18]
Tishkovets [19]

2.6. T-matrix theory and computations of electromagnetic scattering by discrete random media

Dlugach and Mishchenko [20]
Mishchenko and Liu [21]
Mishchenko et al. [22–24]
Petrova et al. [25]
Tishkovets [19]
Tse et al. [26]

2.7. Relation of the T-matrix method to other theoretical approaches

Farafonov et al. [6]
Il'in et al. [7]
Rother [27]

2.8. Symmetry properties of the T-matrix and analytical ensemble-averaging approaches

Simpson et al. [28]

2.9. Convergence of various implementations of the T-matrix method

Ding et al. [29,30]
Farafonov et al. [6]

2.10. T-matrix calculations for homogeneous spheroids

Auger et al. [31]
Bahrami et al. [32]

Bailey [33]
Battaglia and Zimmer [34]
Battaglia et al. [35]
Baumgarten et al. [36]
Clavano et al. [37]
Daerden et al. [38]
Davis et al. [39]
Depue et al. [40]
Ding et al. [29,30]
Dlugach and Mishchenko [20]
Duncan and Thomas [41]
Englert and Stevens [42]
Grothe et al. [43]
Itzkan et al. [44]
Karasiński et al. [45]
Keener et al. [46]
Khlebtsov and Khlebtsov [47]
Khlebtsov et al. [48,49]
Kobayashi et al. [50]
Kong and Shore [51]
Korshunov [52]
Lasue et al. [53]
Lee et al. [54]
Levy et al. [55]
Matsunaga et al. [56]
McKigney et al. [57]
Meirold-Mautner et al. [58]
Moreno et al. [59]
Nousiainen [60]
Penttilä et al. [61]
Ramachandran et al. [62]
Rapp et al. [63]
Rydberg et al. [64]
Sheppard [65]
Simpson and Hanna [66]
Sinyuk et al. [67]
Sohl et al. [68,69]
Sun et al. [70]
Tian et al. [71]
Vaidya et al. [72]
Wagner et al. [73]
Waquet et al. [74]
Xie et al. [75,76]
Yang et al. [77]
Zasetsky et al. [78]

2.11. T-matrix calculations for Chebyshev and generalized Chebyshev particles

Chýlek et al. [79]
Grothe et al. [43]
Petrov et al. [9]

2.12. T-matrix calculations for finite circular cylinders

Bailey [33]
Baran [80]
Baumgarten et al. [36]
Dlugach and Mishchenko [20]
Edwards et al. [81]
Khlebtsov and Khlebtsov [47]
Nicolet et al. [82]
Penttilä et al. [61]
Petrov et al. [13]
Rydberg et al. [64]
Sohl et al. [68]
Stubenrauch et al. [83]
Wagner et al. [73]
Weinman and Kim [84]

2.13. T-matrix calculations for various rotationally symmetric particles

Alekseeva et al. [85]
Auger et al. [31]
Bahrami et al. [32]
Khlebtsov and Khlebtsov [47]
Khlebtsov et al. [48,49]
Petrov et al. [12,13]
Sohl et al. [68]

2.14. T-matrix calculations for ellipsoids, polyhedral scatterers, and other particles lacking axial symmetry

Baran [80]
Hellmers and Wriedt [86]
Petrov et al. [13]
Yan and Yao [87]

2.15. T-matrix calculations for layered and composite particles

Petrov et al. [11]

2.16. T-matrix calculations for clusters of homogeneous spheres

Adachi et al. [88]
Arya [89]
Auger et al. [16,31]
Baudry et al. [90]
Borghese et al. [91,92]
Bossis et al. [93]
Chern et al. [94]
Cohanoschi et al. [95]
Doyle et al. [96]
Guirado et al. [97]
Gumerov and Duraiswami [17]
Jacquier and Gruy [98,99]

Köhler et al. [100]
Kong and Shore [51]
Lecler et al. [101]
Lee et al. [102]
Liu and Mishchenko [103]
Liu et al. [104]
Meiners and Jacob [105]
Mishchenko and Liu [21]
Mishchenko et al. [22–24]
Okada et al. [106]
Pellegrini et al. [107]
Penttilä et al. [61]
Petrov et al. [12]
Petrova et al. [25]
Schneiderheinze et al. [108]
Sentenac et al. [109]
Sumeruk et al. [110]
Xu and Sun [111]
Zhao et al. [112]
Zou and Schatz [113]

2.17. *T-matrix calculations for clusters of layered spheres*

Khlebtsov et al. [114]
Zhao et al. [112]

2.18. *T-matrix calculations for clusters of nonspherical monomers*

Auger et al. [16]

2.19. *T-matrix calculations of optical resonances in nonspherical particles*

Alekseeva et al. [85]
Arya [89]
Chern et al. [94]
Cohanoschi et al. [95]
Khlebtsov and Khlebtsov [47]
Khlebtsov et al. [48]
Sumeruk et al. [110]
Zhao et al. [112]
Zou and Schatz [113]

2.20. *T-matrix calculations of optical forces and torques on small particles*

Borghese et al. [91,92,115]
Emig et al. [116]
Köhler et al. [100]
Loke et al. [8]
Nieminen et al. [117]
Simpson and Hanna [66]
Simpson et al. [28]
Yan and Yao [87,118]

2.21. T-matrix calculations of internal, surface, and local fields

Arya [89]
Cohanoschi et al. [95]
Zhao et al. [112]
Zou and Schatz [113]

2.22. Illumination by focused beams and non-plane waves

Borghese et al. [92]
Simpson and Hanna [66]
Yan and Yao [87]

2.23. Use of T-matrix calculations for testing other theoretical techniques

Bossis et al. [93]
Farafonov et al. [6]
Jacquier and Gruy [98,99]
Lecler et al. [101]
Okada et al. [106]
Penttilä et al. [61]
Sun et al. [70]
Xu and Sun [111]
Yang et al. [77]

2.24. Comparisons of T-matrix and effective-medium-approximation results

Doyle et al. [96]

2.25. Comparisons of T-matrix and controlled laboratory results

Auger et al. [16,31]

2.26. Use of T-matrix calculations for analyzing laboratory data

Doyle et al. [96]
Itzkan et al. [44]
Matsunaga et al. [56]
Ramachandran et al. [62]
Wagner et al. [73]
Zasetsky et al. [78]

2.27. T-matrix modeling of scattering properties of mineral aerosols in the terrestrial atmosphere and soil particles

Hu et al. [119]
Karasiński et al. [45]
Korshunov [52]
Lee et al. [54]
Levy et al. [55]
Natraj and Spurr [120]
Nousiainen [60]

Sinyuk et al. [67]
Waquet et al. [74]
Yang et al. [77]
Zasetsky et al. [78]

2.28. T-matrix modeling of scattering properties of carbonaceous and soot aerosols and soot-containing aerosol and cloud particles

Adachi et al. [88]
Liu and Mishchenko [103]
Xie et al. [75,76]

2.29. T-matrix modeling of scattering properties of cirrus cloud particles

Baran [80]
Davis et al. [39]
Edwards et al. [81]
Eriksson et al. [121]
Nicolet et al. [82]
Rydberg et al. [64]
Stubenrauch et al. [83]
Wagner et al. [73]

2.30. T-matrix modeling of scattering properties of hydrometeors

Bahrami et al. [32]
Battaglia and Zimmer [34]
Battaglia et al. [35]
Depue et al. [40]
Kobayashi et al. [50]
Marzano et al. [122]
Meirold-Mautner et al. [58]
Sheppard [65]
Tian et al. [71]
Weinman and Kim [84]

2.31. T-matrix modeling of scattering properties of terrestrial stratospheric aerosol and cloud particles

Blum et al. [123]
Daerden et al. [38]
Grothe et al. [43]
Nielsen et al. [124]
Wagner et al. [73]

2.32. T-matrix modeling of scattering properties of noctilucent cloud particles

Baumgarten et al. [36]
Englert and Stevens [42]
Rapp et al. [63]

2.33. T-matrix modeling of scattering properties of hydrosol particles

Clavano et al. [37]

2.34. T-matrix modeling of scattering properties of aerosol and cloud particles in planetary atmospheres

Bailey [33]
Liang et al. [125]

2.35. T-matrix modeling of scattering properties of interstellar, interplanetary, and cometary particles

Köhler et al. [100]
Lasue et al. [53]
Moreno et al. [59]
Vaidya et al. [72]

2.36. T-matrix computations for industrial and military applications

Petrov et al. [12]

2.37. T-matrix computations for biomedical applications

Baudry et al. [90]
Duncan and Thomas [41]
Itzkan et al. [44]
Keener et al. [46]
Ramachandran et al. [62]
Schneiderheinze et al. [108]

2.38. T-matrix computations of anisotropic and aggregation properties of colloids and other disperse media

Bossis et al. [93]
Liu et al. [104]

3. Particles near infinite interfaces

3.1. Spherically symmetric particles

Francoeur et al. [126]
Mackowski [127]

3.2. Nonspherically symmetric finite particles

Francoeur et al. [126]
Mackowski [127]

3.3. Finite particles on incident side of planar interface

Francoeur et al. [126]
Mackowski [127]
Riefler et al. [128]

3.4. Tools for particle characterization

Francoeur et al. [126]

3.5. Convergence of results

Mackowski [127]

3.6. Resonances

Francoeur et al. [126]

Acknowledgments

We thank Josefina Mora and Zoe Wai for helping to obtain copies of publications that were not readily accessible. This project was sponsored by the NASA Radiation Sciences Program managed by Hal Maring.

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